

WHAT IS CLAIMED IS:

1       1. A laser diode driver output stage for driving an  
2       associated laser diode device, the laser diode driver output  
3       stage comprising:

4               a driver circuit having at least one input node and an  
5       output node, the driver circuit adapted to receive an input  
6       data signal at the at least one input node and provide an  
7       output signal at the output node in response to the data  
8       signal; and

9               a transformer coupled to the output node of the driver  
10      circuit, the transformer adapted to receive the output signal  
11      at a first side of the transformer and apply impedance  
12      compensation to the output signal to provide an output drive  
13      signal from a second side of the transformer, whereby the  
14      output drive signal is used to drive the associated laser  
15      diode device.

1       2. The laser diode driver output stage of claim 1,  
2       wherein the first side of the transformer comprises a primary  
3       side and the second side of the transformer comprises a  
4       secondary side.

1           3. The laser diode driver output stage of claim 2,  
2 wherein a negative terminal of the primary side of the  
3 transformer is adapted to receive the output signal from the  
4 driver circuit, and a negative terminal of the secondary  
5 side of the transformer is adapted to provide the output  
6 drive signal.

1           4. The laser diode driver output stage of claim 3,  
2 wherein the primary side of the transformer is adapted to  
3 compensate for a parasitic capacitance associated with the  
4 driver circuit at a first frequency of operation.

1           5. The laser diode driver output stage of claim 4,  
2 further comprising a primary side resistor coupled in  
3 parallel with the primary side of the transformer, the  
4 primary side resistor adapted to repress an output impedance  
5 associated with the primary side of the transformer at a  
6 second frequency of operation higher than the first  
7 frequency of operation.

1           6. The laser diode driver output stage of claim 5,  
2 further comprising:

3           a termination resistor connected to a positive terminal  
4 of the primary side of the transformer, wherein the output  
5 impedance of the laser diode driver output stage is  
6 substantially equal to the impedance of the termination  
7 resistor at a third frequency of operation lower than the  
8 first frequency of operation.

1           7. The laser diode driver output stage of claim 5,  
2 further comprising:

3           a secondary side resistor coupled in parallel with the  
4 secondary side of the transformer, the secondary side  
5 resistor and the secondary side of the transformer adapted  
6 to compensate for the impedance of the termination resistor  
7 at the third frequency of operation.

1           8. The laser diode driver output stage of claim 1,  
2 wherein the driver circuit further comprises an output  
3 switch architecture.

1           9. The laser diode driver output stage of claim 1,  
2       wherein the driver circuit comprises a differential  
3       amplifier.

1           10. The laser diode driver output stage of claim 1,  
2       wherein the driver circuit comprises:

3               a first switch transistor adapted to receive a first  
4       differential input data signal of the input data signal at  
5       a first gate node; and

6               a second switch transistor adapted to receive a second  
7       differential input data signal of the input data signal at  
8       a second gate node,

9               wherein a first emitter node of the first switch  
10      transistor is connected to a second emitter node of the  
11      second switch transistor, and a first collector node of the  
12      second switch transistor is adapted to provide the output  
13      signal to the first side of the transformer.

1           11. The laser diode driver output stage of claim 10,  
2       wherein the first switch transistor comprises a first  
3       bipolar junction transistor, and the second switch  
4       transistor comprises a second bipolar junction transistor.

1           12. The laser diode driver output stage of claim 10,  
2       further comprising a current generator coupled to the first  
3       emitter node and the second emitter node.

1           13. The laser diode driver circuit output stage of  
2       claim 10, wherein a negative terminal of the first side of  
3       the transformer is adapted to receive the output signal from  
4       the first collector node of the second switch transistor,  
5       and a negative terminal of the second side of the  
6       transformer is adapted to provide the output drive signal.

1           14. The laser diode driver output stage of claim 13,  
2       wherein the first side of the transformer is adapted to  
3       compensate for a parasitic capacitance associated with the  
4       first collector node of the second switch transistor at a  
5       first frequency of operation.

1           15. The laser diode driver output stage of claim 1,  
2           further comprising a pre-driver circuit adapted to provide  
3           the input data signal to the driver circuit.

1           16. A method for providing an improved drive signal  
2       from a laser diode driver output stage to a laser diode  
3       device, the method comprising the steps of:

4           receiving an input data signal at a driver circuit;  
5           providing an output signal from the driver circuit in  
6       response to the data signal;

7           receiving the output signal at an input to a first side  
8       of a transformer; and

9           applying impedance compensation to the output signal  
10      to provide an output drive signal from an output of a second  
11      side of the transformer, whereby the output drive signal is  
12      used to drive the laser diode device.

1           17. The method of claim 16, wherein the first side of  
2       the transformer comprises a primary side and the second side  
3       of the transformer comprises a secondary side.

1           18. The method of claim 17, wherein the step of  
2       applying impedance compensation comprises compensating for  
3       a parasitic capacitance associated with the driver circuit

4                   at a first frequency of operation using the primary side of  
5                   the transformer.

1                   19. The method of claim 18, wherein the step of  
2                   applying impedance compensation comprises repressing an  
3                   output impedance associated with the primary side of the  
4                   transformer at a second frequency of operation higher than  
5                   the first frequency of operation using a primary side  
6                   resistor connected in parallel with the primary side of the  
7                   transformer.

1                   20. The method of claim 19, wherein the output  
2                   impedance of the laser diode driver output stage at a third  
3                   frequency of operation lower than the first frequency of  
4                   operation is substantially equal to the impedance of a  
5                   termination resistor coupled to a positive terminal of the  
6                   primary side of the transformer.

1                   21. The method of claim 20, wherein the step of  
2                   applying impedance compensation to the output signal further  
3                   comprises the step of compensating for the impedance of the

4           termination resistor at the third frequency of operation  
5           using a secondary side resistor coupled in parallel with the  
6           secondary side of the transformer, and a secondary side of  
7           the transformer.

1           22. The method of claim 16, further comprising the  
2           step of providing the output drive signal to the laser diode  
3           device using a transmission line.